

**4D LCD PTY LTD** 

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# 4DLCD-43480272-IPS-[RTP/CTP]-[CLB]

4.3" TFT Liquid Crystal Display

# **DATASHEET**

**Document Date: 22<sup>nd</sup> February 2021** 

**Document Revision: 1.1** 

# **Revision History**

REVISION	DATE	COMMENT	REMARKS
1.0	10/09/2020	Initial Version	Initial Version
1.1	22/02/2021	Information clarification / improvement. Updated LED voltage/current information	

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# 1. General Specification

4DLCD-43480272-IPS is a colour active matrix LCD module incorporating amorphous silicon TFT (Thin Film Transistor). It is composed of a colour TFT-LCD panel, driver IC, FPC and a backlight unit and with/without a Resistive/Capacitive Touch Panel (RTP or CTP), and with/without a Cover Lens Bezel (CLB). The module display area contains 480 x 272 pixels. This product accords with RoHS environmental criterion.

	ITEM	CONTENTS	UNIT
LCD Type		TFT / Transmissive / Normally white	
Size		4.3	Inch
Viewing Direct	ion	ALL	
Display Mode		Normally Black	
4DLCD-43480272-IPS		105.50 x 67.20 x 2.90	
LCD	4DLCD-43480272-IPS-RTP	105.50 x 67.20 x 4.10	
$(W \times H \times T)$	4DLCD-43480272-IPS-CTP	105.50 x 67.20 x 4.42	mm
	4DLCD-43480272-IPS-CTP-CLB	123.04 x 84.46 x 4.42 (Including CLB)	
Active Area (W	/ × H)	95.04 × 53.856	mm
Dot Pitch (W ×	H)	0.198 × 0.198	mm
Number of Do	ts (Pixels)	480 (RGB) × 272	
Driver IC		Source: SC7283	
Backlight Type		10 LEDs	
	4DLCD-43480272-IPS	600 (typical)	
Surface	4DLCD-43480272-IPS-RTP	540 (typical)	ad/m²
Luminance	4DLCD-43480272-IPS-CTP	510 (typical)	cd/m <sup>2</sup>
	4DLCD-43480272-IPS-CTP-CLB	510 (typical)	
Interface Type		Parallel RGB 16/24-bit	
Color Depth		16.7M	
Pixel Arrangen	nent	RGB Vertical Stripe	
Surface Treatn	nent	AG	
Input Voltage		3.3 (typical)	V
With/Without TP (Touch Panel)		4DLCD-43480272-IPS — Without TP 4DLCD-43480272-IPS-RTP — With Resistive Touch 4DLCD-43480272-IPS-CTP — With Capacitive Touch 4DLCD-43480272-IPS-CTP-CLB — With Capacitive Touch and Cover Lens Bezel	
	4DLCD-43480272-IPS	48.0	
Weight	4DLCD-43480272-IPS-RTP	62.2	g
VVCIBIIL	4DLCD-43480272-IPS-CTP	69.0	Ь
	4DLCD-43480272-IPS-CTP-CLB	73.0	

Note 1: RoHS compliant

Note 2: LCD weight tolerance: ± 5%.

#### **Part Number Details:**

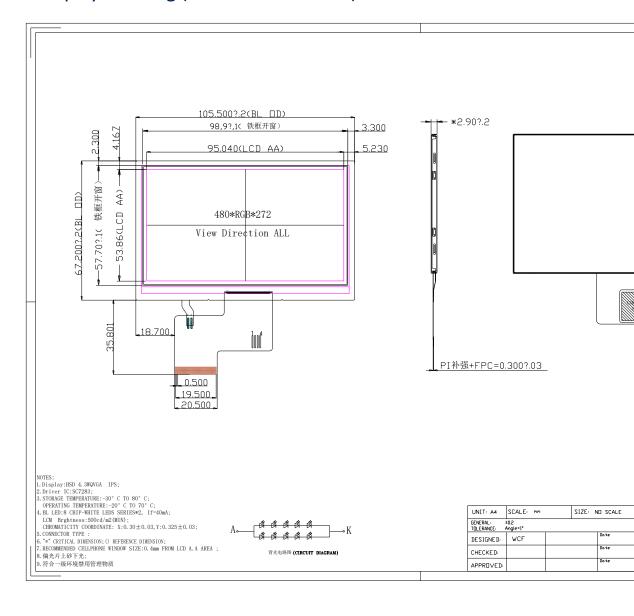
4DLCD 4D Systems LCD Display
43480272 4.3-inch, 480 x 272 Resolution
IPS In-Plane Switching

RTP Resistive Touch
CTP Capacitive Touch
CLB Cover Lens Bezel



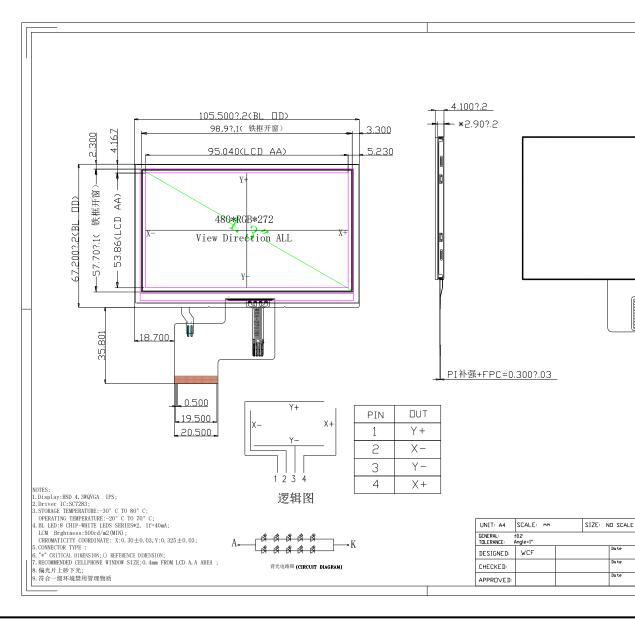


# 2. TFT LCD Display Drawing (Non-Touch Version)



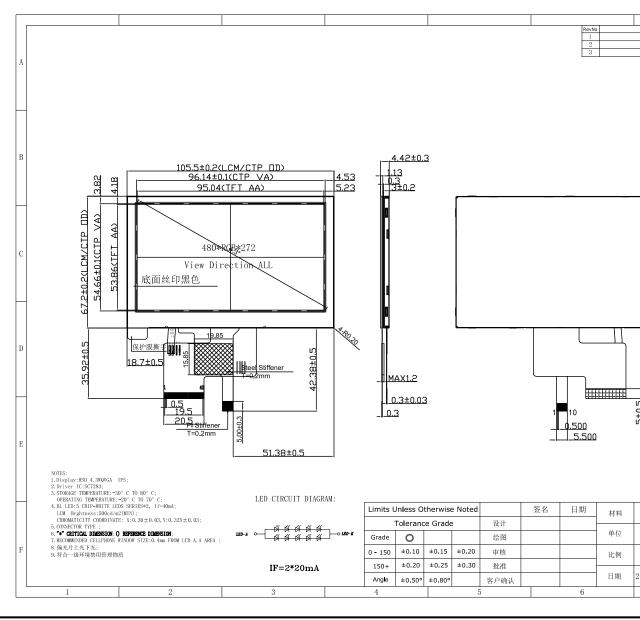
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# 3. TFT LCD Display Drawing (Resistive Touch Version)



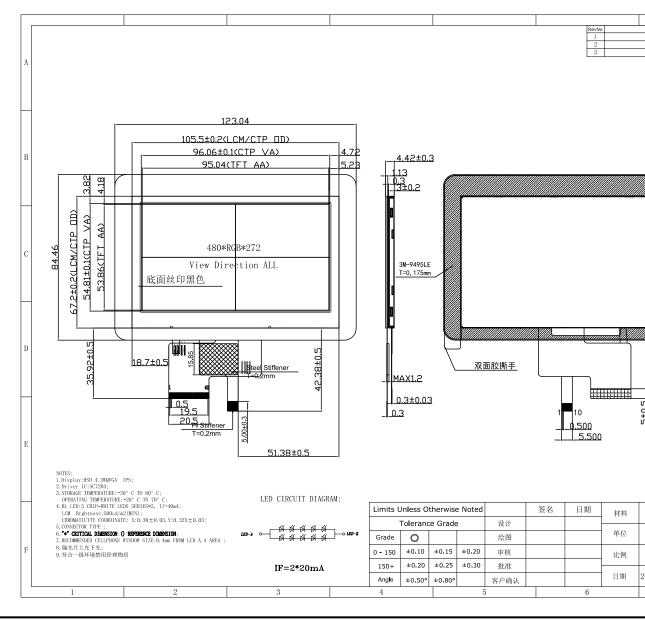
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# 4. TFT LCD Display Drawing (Capacitive Touch Version)



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# 5. TFT LCD Display Drawing (Capacitive Touch Version - with Cover Lens Bezel)



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# 6. Absolute Maximum Ratings

PARAMETER	SYMBOL	MIN	MAX	UNIT
Supply Voltage for LCD Logic	VDD/VCC	-0.3	4.6	V
Supply Voltage for TP Logic	VDD/VCC-VSS	-	-	V
Input Voltage for Logic	VIN	VSS-0.5	VDD	V
LED forward voltage (each LED)	IF	-	25	mA
Operating Temperature	Тор	-20	70	°C
Storage Temperature	Тѕт	-30	80	°C
Humidity	RH	-	90% (Max 60°C)	RH

# 7. Electrical Characteristics

PARAMETER	SYMBOL	MIN	TYP	MAX	UNIT
Power Voltage	VDD/DCC	2.6	3.3	3.6	V
Input Current	IVDD	-	-	1	mA
Input Voltage 'H' Level	ViH	0.7 VDD	-	VDD	V
Input Voltage 'L' Level	VIL	0	-	0.3 VDD	V

# 8. Electro-Optical Characteristics

ITEM		SYM	CONDITION	MIN	TYP	MAX	UNIT	REMARK
Response Time		Tr+Tf	θ=0	-	25	30	ms	Figure 1 (4)
Contrast Ratio		Cr	0	350	500	-	-	Figure 2 (1)
Luminance Uniform	nity	δ WHITE	Ø=0	75	80	-	%	Figure 2 (3)
			4DLCD-43480272	450	500	-		
			4DLCD-43480272-RTP	390	400	1		
Surface Luminance		Lv	4DLCD-43480272-CTP	460	475	1	cd/m <sub>2</sub>	Figure 2 (2)
			4DLCD-43480272-CTP- CLB	460	475	1		
			Ø = 90°	60	70	-	deg	Figure 3 (6)
Viouing Angle Band		θ	Ø = 270°	50	60	1		
Viewing Angle Rang	ge	0	Ø = 0°	60	70	1		
			Ø = 180°	60	70	1		
	Red	х		0.574	0.624	0.674		
	Reu	У		0.318	0.368	0.418		
	Green	х	θ=0°	0.300	0.350	0.400		
CIE (x,y)	Green	У	Ø=0°	0.500	0.550	0.600		Fig 2 (F)
Cromacity	Dlug	х	Ta=25	0.093	0.143	0.193		Figure 2 (5)
	Blue	У		0.069	0.119	0.169		
	\A/la:4 -	х		0.260	0.310	0.360		
	White	У		0.283	0.333	0.383		

## 9. Backlight Characteristics

PARAMETER	SYMBOL	MIN	TYP	MAX	UNIT
Voltage for LED backlight (each LED)	Vı	-	3.0	3.3	V
Voltage for LED backlight (entire String – 10 LED's)	Vistring	-	15	16.5	V
Current for LED backlight (each LED)	lı	-	20	30	mA
Current for LED backlight (entire String – 10 LED's)	listring	-	40	60	mA
LED Life Time	-	30000	-	-	Hrs

Note: The LED life time is defined as the module brightness decrease to 50% original brightness at Ta=25°C.

Note 1: Contrast Ratio(CR) is defined mathematically as below, for more information see Figure 1.

Contrast Ratio = Average Surface Luminance with all white pixels (P1, P2, P3, P4, P5)

Average Surface Luminance with all black pixels (P1, P2, P3, P4, P5)

**Note 2**: Surface luminance is the LCD surface from the surface with all pixels displaying white. For more information, see Figure 2.

Lv = Average Surface Luminance with all white pixels (P1, P2, P3, P4, P5)

Note 3: The uniformity in surface luminance  $\delta$  WHITE is determined by measuring luminance at each test position 1 through 5, and then dividing the maximum luminance of 5 points luminance by minimum luminance of 5 points luminance. For more information, see Figure 2.

δ WHITE = Minimum Surface Luminance with all white pixels (P1, P2, P3, P4, P5)

Maximum Surface Luminance with all white pixels (P1, P2, P3, P4, P5)

**Note 4**: Response time is the time required for the display to transition from white to black (Rise Time, Tr) and from black to white (Decay Time, Tf). For additional information see FIG 1. The test equipment is Autronic-Melchers ConoScope series.

**Note 5**: CIE (x, y) chromaticity, the x, y value is determined by measuring luminance at each test position 1 through 5, and then make average value.

**Note 6**: Viewing angle is the angle at which the contrast ratio is greater than 2. For TFT module the contrast ratio is greater than 10. The angles are determined for the horizontal or x axis and the vertical or y axis with respect to the z axis which is normal to the LCD surface. For more information, see Figure 3.

**Note 7**: For viewing angle and response time testing, the testing data is based on Autronic-Melchers ConoScope series. Instruments for Contrast Ratio, Surface Luminance, Luminance Uniformity, CIE the test data is based on TOPCONs BM-5 photo detector.

Figure 1. The definition of response time

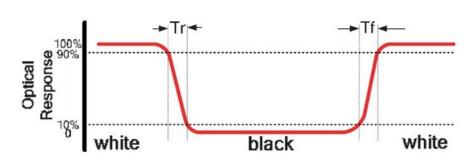


Figure 2. Measuring method for Contrast ratio, surface luminance, Luminance uniformity, CIE (x, y) chromaticity

A: 5 mm B:5 mm

H,V: Active Area

Light spot size ∅=5mm, 500mm distance from the

LCD surface to detector lens

measurement instrument is TOPCON's luminance

meter BM-5

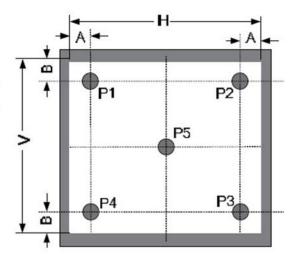
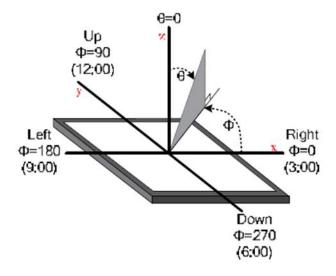


Figure 3. The definition of viewing angle



# 10. Interface Descriptions

# 10.1 LCD Interface

PIN NO.	SYMBOL	DESCRIPTION	REMARK
1	LED-	Cathode of LED Backlight	
2	LED+	Anode of LED Backlight	
3	GND	Ground	
4	DVDD	Power supply	
5	R0	Red data input R0	Note1
6	R1	Red data input R1	Note1
7	R2	Red data input R2	Note1
8	R3	Red data input R3	Note1
9	R4	Red data input R4	Note1
10	R5	Red data input R5	Note1
11	R6	Red data input R6	Note1
12	R7	Red data input R7	Note1
13	G0	Green data input G0	Note1
14	G1	Green data input G1	Note1
15	G2	Green data input G2	Note1
16	G3	Green data input G3	Note1
17	G4	Green data input G4	Note1
18	G5	Green data input G5	Note1
19	G6	Green data input G6	Note1
20	G7	Green data input G7	Note1
21	B0	Blue data input B0	Note1
22	B1	Blue data input B1	Note1
23	B2	Blue data input B2	Note1
24	B3	Blue data input B3	Note1
25	B4	Blue data input B4	Note1
26	B5	Blue data input B5	Note1
27	B6	Blue data input B6	Note1
28	B7	Blue data input B7	Note1
29	GND	Ground	
30	DCLK	Clock for input data. Data latched at rising/falling edge of this signal.  Default is falling edge.	
31	DISP	Standby mode control. (Normally pull high) STBYB="L", enter standby mode for power saving. Timing controller source driver will turn off, all outputs are Hi-Z. STBYB="H", normal operation.	
32	HS	Horizontal sync input	
33	VS	Vertical sync input	
34	DE	Input data enable control. When DE mode, active High to enable data input (Normally pull low)	
35	NC	No Connection	
36	GND	Ground	
37	XR/NC	The touch panel X right pin (RTP only, NC for other touch types)	Note2
38	YD/NC	The touch panel Y down pin (RTP only, NC for other touch types)	Note2
39	XL/NC	The touch panel X left pin (RTP only, NC for other touch types)	Note2
40	YU/NC	The touch panel Y up pin (RTP only, NC for other touch types)	Note2

Note1: For applications that uses less than 24 bits, pins are tied to ground to reduce the total bits used.

Note2: Pins 37, 38, 39 and, 40 are only applicable to touch screen displays (4DLCD-xxxxxxxx-RTP).

#3.3V    BL_V+ 2	BL_V	- 1		1
#33V	BL V	+ 2		
CD_R0	+3.3V	3		
LCD_R0	T			
CCD_R1	LCD_R0			
CCD R2	LCD R1	6		
CCD_R3	LCD R2	7		
CCD R4	LCD_R3	8		
CCD_R6	LCD_R4	9		
CCD_R6	LCD_R5	10		
CCD_R/	LCD_R6	. 11		
CCD G0	LCD_R7	12		
CCD G1	LCD_G0	13		
CCD_G3	LCD_G1	14		
CCD_G4		15		
CCD_G5	LCD_G3	16		
CCD_GS		17		
CCD G6	LCD_G5	18		
CCD G/	LCD_G6	19		
CCD_B0	LCD_G7	20		
CCD_B1	LCD_B0	21		
CCD_B2	LCD_B1	22		
CCD_B3	LCD_B2	23		
CCD_B4	LCD_B3			
CCD_BS				
CLD_B6	LCD_B5	26		
CCD_B7		27		
CD_DCLK   30	LCD_B7			
CLK   DISP   HSYNC   SI   LCD_HSYNC   SI   HSYNC   SI   LCD_DE   SI   SI   SI   SI   SI   SI   SI   S		29		
CCD_USP		30		
HSYNC   SZ   HSYNC   VSYNC   VSYNC   DEN   NC   SA   NC   SA   NC   NC   SA   NC   SA   NC   NC   NC   NC   NC   NC   NC   N				
VSYNC   33				
34   DEN   NC   GND   XR   YD   XL   YU   This has no connection (NC)				
XR* 36 GND XR YD XR YD XL YU * This has no connection (NC)	LCD_DE			
XR* 36 37 YD* 38 XL * 39 YU * 40 *This has no connection (NC)		- Y		
YD* 38 YD XL YU* 40 YU  *This has no connection (NC)	*	_		
YD 38 YD XL YU 40 YU * This has no connection (NC)	XR			
*This has no connection (NC)	YD*			
*This has no connection (NC)	, AL			
*This has no connection (NC)	<u>YU *</u>	40		
	_	<u> </u>		
	7	=		
	* This has no	connection	on (NC)	

BL V BL V	+ 2 3 4 5	LEDK LEDA GND
3.3V	3	GND
Ť.	4	
1		VCC
	6	R0
LCD R0	7	R1
LCD R1	8	R2
LCD_R2	9	R3
LCD R3	10	R4
LCD R4	11	R5
LCD R5	12	R6
200_110	13	R7
1	14	G0
LCD G0	15	G1
LCD G1	16	G2
LCD_G2	17	G3
LCD G3	18	G4
LCD G4	19	G5
LCD G5	20	G6
	21	G7
1	22	B0
LCD_B0	23	B1
LCD B1	24	B2
LCD B2	25	B3
LCD B3	26	B4
LCD B4	27	B5
LCD B5	28	B6
	29	B7
LCD DCLK	30	GND
LCD_RESET	31	CLK
LCD HSYNC	32	DISP
LCD_VSYNC	33	HSYNC
LCD DE	34	VSYNC
	35	DEN
	36	NC
XR*	37	GND
YD*	38	XR
XL *	39	YD
YU *	40	XL
		YU
<u>_</u>	<u>_</u>	

\* This has no connection (NC) for Non-touch displays

24 Bit mode

18 Bit mode

#### 10.2 CTP Interface

PIN No.	SYMBOL	DESCRIPTION	REMARK
1	NC	No Connect	
2	NC	No Connect	Only connected
3	RST	Reset pin	to the CTP Panel,
4	GND	Ground	not connected to
5	INT	Interrupt signal from CTP	the LCD itself
6	SDA	I2C SDA	
7	SCL	I2C SCL	N/A for Non-
8	GND	Ground	touch and RTP
9	GND	Ground	models.
10	VDD	Power Supply (3.3V)	

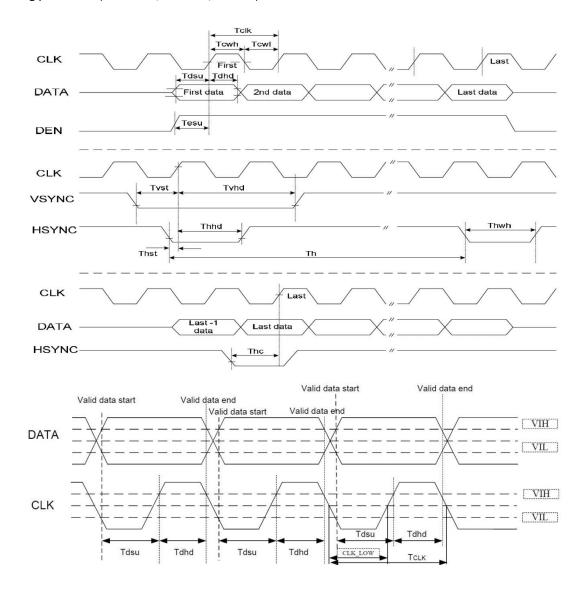
The Capacitive Touch is driven by a **Focaltech FT5436** capacitive touch driver IC, which utilizes an I2C interface, and is capable of 5-point touch.

# 11. LCD Timing Details

#### 11.1 Timing Chart

PARAMETER	SYMBOL	MIN	TYP	MAX	UNIT	CONDITION
CLK Clock Time	Tclk	1/Max(Fclk)	-	1/Min(Fclk)	ns	-
CLK Pulse Duty	Tchw	40	50	60	%	Тськ
HSYNC to CLK	Thc	-	-	1	CLK	-
HSYNC Width	Thwh	1	-	-	CLK	-
VSYNC Width	Tvwh	1	-	-	ns	-
HSYNC Period Time	Th	60	63.56	67	ns	-
VSYNC Set-up Time	T <sub>vst</sub>	12	-	-	ns	-
VSYNC Hold Time	Tvhd	12	-	-	ns	-
HSYNC Setup Time	Thst	12	-	-	ns	-
HSYNC Hold Time	Thhd	12	-	-	ns	-
Data Set-up Time	Tdsu	12	-	-	ns	D00~D23 to CLK
Data Hold Time	Tdhd	12	-	-	ns	D00~D23 to CLK
DEN Set-up Time	Tesu	12	-	-	ns	DEN to CLK

Timing parameter (VDD=3.3V, GND=0V, Ta=25C)

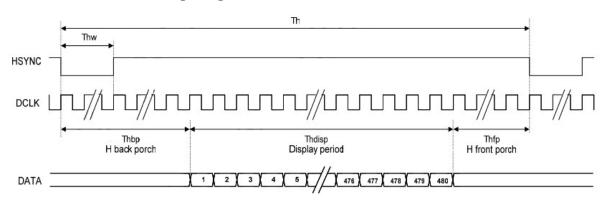


Timing parameter (VDD=3.3V, GND=0V, Ta=25C)

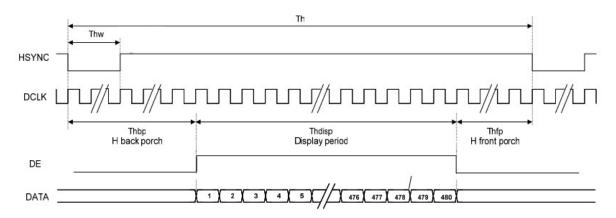
## 11.2 Timing Characteristic

ITEM		SYMBOL	MIN	TYP	MAX	UNIT	
DCLK Frequency		Fclk	8	9	12	MHz	
DCLK Period		Tclk	83	111	125	Ns	
Hsync	Period Time	Th	485	531	598	DCLK	
	Display Period	Thdisp	-	480	-	DCLK	
	Back Porch	Thbp	3	43	43	DCLK	By H BLANKING setting
	Front Porch	Thfp	2	8	75	DCLK	
	Pulse Width	Thw	2	4	43	DCLK	
Vsync	Period Time	Tv	276	292	321	Н	
	Display Period	Tvdisp	-	272	-	Н	
	Back Porch	Tvbp	2	12	12	Н	By V BLANKING setting
	Front Porch	Tvfp	2	8	37	Н	
	Pulse Width	Tvw	2	4	12	Н	

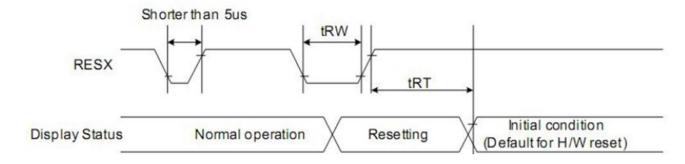
## 11.3 SYNC Mode Timing Diagram



# 11.4 SYNC-DE Mode Timing Diagram



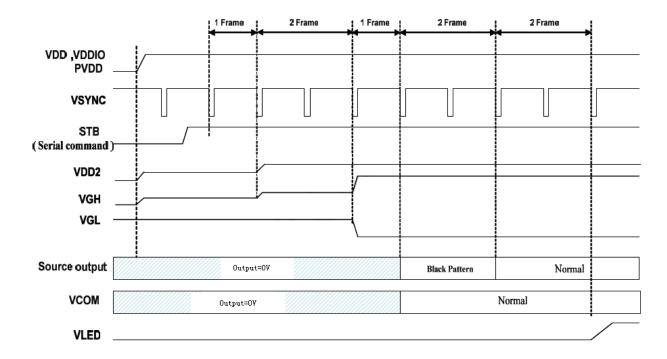
# 11.5 Reset Timing



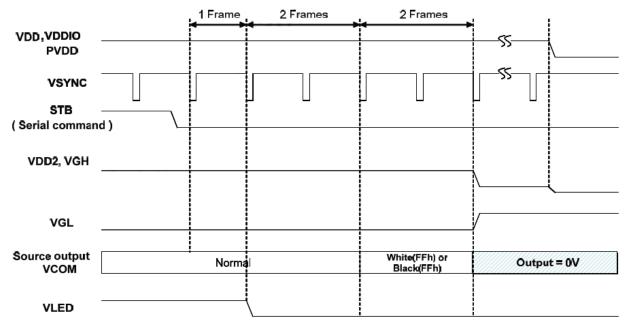
SIGNAL	SYMBOL	PARAMETER	MIN	MAX	UNIT
RESET	tRW	Reset low pulse width	40	1	us
	tRT	Docat complete time	-	5 (note1)	ms
		Reset complete time	-	120 (note2)	ms

**Note 1**: When reset applied during SLPIN mode **Note 2**: When reset applied during SLPOUT mode.

#### 11.6 Power On Sequence



# 11.7 Power-off Sequence



#### Note:

When normally-black LC is used, please send black pattern to discharge the panel. When normally-white LC is used, please send white pattern to discharge the panel

# 12. Reliability Test

No.	SYMBOL	TEST CONDITION	REMARK		
		80°C±2°C 96H			
1	High Temperature Storage	Restore 2H at 25°C			
		Power off			
		-30°C±2°C 96H			
2	Low Temperature Storage	Restore 2H at 25°C			
		Power off			
3	High Temperature Operation	70°C±2°C 96H			
	riigii Terriperature Operation	Power on			
4	Low Temperature Operation	-20°C±2°C 96H			
4	Low remperature operation	Power on	After test cosmetic and		
		60°C±2°C	electrical defects should not happen.		
5	High Temperature & Humidity Operation	90%RH 96H			
		Power on			
		-20°C←→25°C←→70°C			
		30min 5min 30min			
6	Temperature Cycle				
		After 10 cycles, restore 2H at			
		25°C Power off			
7	Vibration Test	10Hz~150Hz, 100m/s², 120min			
8	Shock Test	Half-sinewave, 300m/s <sup>2</sup> , 11ms			
O	שווטנג ובשנ	rian-sinewave, soonijs, 11111s			

**Note:** The Displays are of the highest rated 'Grade A', which allows for 0-4 defective pixels. A defective pixel could be solid Black (Dead), White, Red, Green or Blue.

## 13. Precautions for Using LCD Modules

#### 13.1 Handing Precautions

- The display panel is made of glass and polarizer. The glass is fragile. It tends to be chipped during handling
  especially on the edges. Please avoid dropping or jarring. Please be careful not subject it to a mechanical shock
  by dropping it on impact.
- If the display panel is damaged and the liquid crystal substance leaks out, be sure not to get any of it in your mouth. If the substance contacts your skin or clothes, wash it off using soap and water.
- Do not apply excessive force to the display surface or to the adjoining areas since this may cause the color tone to vary. Do not touch the display with bare hands. This will stain the display area and degraded insulation between terminals (some cosmetics are determined by the polarizer).
- The polarizer covering the display surface of the LCD module is soft and easily scratched. Handle this polarizer carefully. Do not touch, push or rub the exposed polarizer with anything harder than an HB pencil lead (e.g., glass, tweezers, etc.). Do not put or attach anything on the display area to avoid leaving marks on it. Condensation on the surface and contact with terminals due to cold temperature will damage, stain or contaminate the polarizer. After products are tested at low temperature they must be warmed up in a container before coming into contact with room temperature air.
- If the display surface becomes contaminated, breathe on the surface and gently wipe it with a soft dry cloth. If it is heavily contaminated, moisten the cloth with one of the following solvents
  - Isopropyl alcohol
  - Ethyl alcohol

Do not scrub hard as it might damage the display surface.

- Solvents other than those mentioned above may damage the polarizer. Especially the following.
  - Water
  - o Ketone
  - Aromatic solvents

Wipe off saliva or water drops immediately, contact with water over a long period of time may cause deformation or color fading. Avoid contact with oil and fat.

- Take necessary precautions to minimize corrosion of the electrode. Corrosion of the electrodes is accelerated by water droplets, moisture condensation or current flow in a high-humidity environment.
- Install the LCD Module by using the mounting holes. When mounting the LCD module, make sure it is free of twisting, warping and distortion. In particular, do not forcibly pull or bend the I/O cable or the backlight cable.
- Do not attempt to disassemble or process the LCD module.
- NC terminal should be open. Do not connect anything on it.
- If the logic circuit power is off, do not apply input signals.
- Control Electro-Static Discharge. Since this module uses a CMOS LSI, the same careful attention should be paid to electrostatic discharge as for an ordinary CMOS IC. To prevent destruction of the elements by static electricity, ensure that an optimum work environment is maintained.

- Before removing the LCM from its packing case or incorporating it into a set, be sure that the module and your body has the same electric potential. Be sure to ground your body when handling the LCD modules.
- To reduce the amount of static electricity generated, do not conduct assembly and other work under dry conditions. To reduce the generation of static electricity, please ensure that the air in the work environment is not too dry. A relative humidity of 50%-60% is recommended. As much as possible, make the electric potential of your work clothes and that of the work bench the ground potential.
- The LCD module is coated with a film to protect the display surface. Be careful when peeling off this
  protective film since static electricity may be generated.
- Since the LCM has been assembled and adjusted with a high degree of precision, avoid applying excessive shocks to the module or making any alterations or modifications to it.
  - O Do not alter, modify or change the shape of the tab on the metal frame.
  - Do not make extra holes on the printed circuit board, modify its shape or change the positions of components to be attached.
  - o Do not damage or modify the pattern writing on the printed circuit board.
  - o Absolutely do not modify the zebra rubber strip (conductive rubber) or heat seal connector.
  - o Do not drop, bend or twist the LCM.

#### 13.2 Storage Precautions

When storing the LCD modules, the following precautions are necessary.

- Store them in a sealed polyethylene bag. If properly sealed, there is no need for the desiccant.
- Store them in a dark place. Do not expose to sunlight or fluorescent light, keep the temperature between 0°C and 35°C, and keep the relative humidity between 40%RH and 60%RH.
- The polarizer surface should not come in contact with any other objects. (We advise you to store them in an
  anti-static electricity container in which they were shipped. Some Liquid crystals solidify under low temperature
  (below the storage temperature range) leading to defective orientation or the generation of air bubbles (black
  or white). Air bubbles may also be generated if the module is subjected to low temperature.
- If the LCD modules have been operating for a long time showing the same display patterns, the display patterns may remain on the screen as ghost images and a slight contrast irregularity may also appear. A normal operating status can be regained by suspending use for some time. It should be noted that this phenomenon does not adversely affect performance reliability.
- To minimize the performance degradation of the LCD modules resulting from destruction caused by static electricity etc., please avoid holding the following sections when handling the modules'
  - o Exposed area of the printed circuit board
  - Terminal electrode sections

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